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THE APPLICATION OF ORGANIZED KNOWLEDGE TO NATIONAL WELFARE

By Dr. P. G. NUTTING

DIRECTOR WESTINGHOUSE RESEARCH LABORATORY, EAST PITTSBURGH

THE highest duty of every nation is to live up to its possibilities. If it performs this duty, its welfare is assured and it will command the respect of all other nations. The greatest problem before any nation is that of developing its resources to the utmost. The solution of this problem involves a thorough knowledge of all resources—natural, intellectual, manual and financial—and thorough knowledge of all means of making the most of them. Since our knowledge is far from complete, fundamental principles must be determined by research, and the application of those principles to special problems investigated. Finally, since productive life periods are relatively short, attention must be given the transmission of valuable accumulated knowledge by education.

Every military upheaval focuses attention on fundamental national problems. The lessons learned during the period of a war constitute its most valuable product. One of the great lessons of this war is the value of highly developed resources in inhibiting warfare and in determining its outcome. It behooves us therefore to give earnest consideration to the problem of living up to our possibilities. We have organized knowledge, judgment and experience sufficient to make a good start and the time appears ripe to consider ways and means of making more effective our efforts to further the interests of our country and of all sound portions of the world at large. This outline of some of the more general problems involved may serve to direct increased attention to such problems. Although the value of the application of organized knowledge by specialists to problems of general interest is a matter of the simplest common sense, we are only beginning to apply organized knowledge in an organized manner and the results to be anticipated from such an application are almost beyond conception.

Problems directly concerning the welfare of the nation fall chiefly into six groups: (1) Problems concerning the relation of this to other nations, (2) national problems, (3) problems concerning relations between the nation and organizations within it, (4) problems relating to organizations, (5) those concerning the relation between organizations and individuals and (6) problems relating to individuals. More or less common to all groups are certain general classes of problems of such general interest as to be worth special treatment, namely, (7) education, (8) research and (9) the psychology of achievement.

1. *International Relations.*—Problems in international relations have to do with the relation between one nation and another of equal sovereignty and approximately equal strength, between one nation and other lesser nations, between a nation and its dependencies and with the rights of a nation to deal as it will with its own internal affairs.

The fundamental principle governing international relations is simple from a biological point of view. Those principles will in the end prevail which are backed by the greatest bulk and activity of resources; natural, intellectual, manual and financial; in other words, by the greatest sum of potential and kinetic energies. Mere intellect or money alone will not prevail, nor will natural resources or military strength. The creed of national selfishness goes down before the creed of altruism because it is inconsistent with true international democracy. This can recognize no special privilege among nations, since it is not in accord with the biological principle just stated. In these days of international information and activity, international public opinion will have its way, since it commands the bulk of effective resources. Hesitancy to sacrifice industries and individuals and intrigue by a minority may delay a settlement, but the final outcome is assured.

The right of one sovereign state to deal with another as it sees fit has never been explicitly conceded nor denied, since no direct means of enforcing regulations have existed. The problem of limitations is comparable with that of the right of one individual to treat another as he pleases. Common sense says that a policy of amity and equity is by far the most advantageous; common law holds that certain limitations may be exceeded only at the risk of certain penalties. A nation that oversteps the bounds of amity and equity in its dealings with its neighbors must just as surely pay the penalty, for human races the world over detest a bully and love fair play. In the interest of humanity, however, codes should be formulated and should be enforced by an effective international police in order that bullying and wars for aggrandizement should be put an end to for all time.

All political rights of the smaller sovereign states will undoubtedly be guaranteed by the economic majority of other nations at any time the issue is forced. Such nations are entitled to identically the same inalienable rights to exist, develop and manage their own affairs that are possessed by the strongest nations. On the other hand, the non-political rights of such lesser nations are properly proportional to the massed resources of each.

The relations between a nation and its dependencies must be based on the same principle if there is to be development without revolution. There must be such free interchange of resources as will benefit both colony and mother country. A nation whose policy is one of fair play leaning toward altruism will always be successful with her colonies, while a policy of selfishness and condescension will ruin the best of colonies. Finally, as a colony grows there must be continued readjustment of political rights to keep pace with the increasing relative bulk of intellectual and economic resources in the colony.

The basic principle of world democracy politically is the complete abolition of special privileges. The logical application of this principle to international relations means complete autonomy, self-determination, government by and with the consent of the governed. The practical problems in this field relate to the establishment of such limitations to these rights as may be necessary to secure the ultimate greatest good of the world at large.

2. *National Problems.*—The various classes of national problems center about the single one of securing the maximum development and utilization of resources. Progress requires first of all stability and stability depends primarily upon efficiency of administration. Comprehensive surveys of resources —natural, intellectual, manual and financial—are required as the first step in their development, utilization and conservation. Corps of trained experts must say what can be done and how it can best be done. The actual work of development, conservation and utilization falls chiefly upon individuals and organizations, but it is a governmental function to supervise at all times and regulate when necessary. National authority should be asserted in proportion to national responsibility, that is, to the extent to which the interests of the people as a whole are affected.

Administrative problems relate chiefly to resources and are dealt with through various departments and bureaus. It goes without saying that each class of problems should be cared for by a specialist in that class of work and that the leading specialists of the country should be at the service of the nation. In order to secure an adequate supply of such experts, it may be best to reorganize various departments and bureaus to perform somewhat more of the functions of graduate schools than at present. This would attract more and better men to the national service and secure for the nation and for the industries more high-grade experts in the application of organized knowledge to practical problems. Along with the elimination of partisan politics and other kinds of special privilege, it would be in the interest of administrative efficiency to put in effect a national system of advancement—the student becoming a specialist, the specialist with ability and experience becoming an expert and the expert with broad and sure judgment advancing to the higher administrative positions. This is the "Business Method" and is beyond question the best method of securing efficient administration.

A democracy may be either the best and strongest or the worst and weakest form of government, according to the extent to which it adopts business methods, putting its ablest experts in control at the top and having all important problems solved by specialists. Such a democracy will have a considerable advantage over even the best form of autocracy, since in the latter the governing class is not chosen from so wide a selection.

3. *The Nation and Internal Organizations.*—National stability requires that national authority be supreme over every internal organization, whatever its nature; political, industrial, religious, protective or otherwise. And stability is the first requisite of a national organization. The principle is that the interests of the people as a whole (the nation) must be rated higher than the interests of any component part, be it an individual or a powerful state or industrial organization. Biologically, this all-important principle is so simple as to be absurd. Unless parts of our bodies, for example, worked harmoniously together for the common good, we could not long exist.

The practical problems in this field relate chiefly to the proper limitations to be placed upon organizations to secure the greatest possible good to the nation. The Sherman Law aimed to secure the national welfare against the encroachments of powerful organizations seeking only their own selfish aggrandizement. Its enforcement has resulted in serious interference with normal growth. Such growth should be encouraged, but firmly directed toward the national welfare.

Other more sinister organizations seek not only their own welfare and aggrandizement above that of all other people in the nation, but acknowledge a higher allegiance to an alien head than to the nation. This anomaly is of course a serious menace to national stability and could not long exist except under the cloak of secrecy and evasion. There is but one solution for this problem—elimination of such kind or kinds as are applied to cancerous growths.

Labor organizations, on the other hand, are entirely loyal as a rule, but their aims at first sight appear crude and selfish and evidence little regard for the interests of those not within the organization. Every strike, however, is more than a mere demand for higher wages or for greater power through the closed shop. It is a back fire against the equally selfish aggrandizement of capital. Due to its entrenched position, capital has always been prone to claim special privilege and the lion's share of the profits accruing from the cooperation between laborers, capitalists and engineering experts. It will be difficult to solve the problem of fair play in this case, since it involves the equitable distribution of earnings where no general rules are perhaps possible. Such equity depends largely upon lateral conditions, and these vary widely in special cases. The government is confronted with this problem (1) in an advisory capacity in dealings between industrial organizations and labor and (2) wherever it employs bodies of labor.

4. *Relations between Organizations.*—Problems concerning the relation of one organization to others are relatively few and simple. In equity each one, small or large, must be secured the right to grow and develop its resources without other limitations than those demanded by the general welfare. Combination and secession are to be carefully regulated. Combinations to secure greater efficiency and economy are to be encouraged and fostered while side combinations for the purpose of securing exclusive rights are not to be tolerated. Wide latitude may safely be given any organization in the management of exclusively internal affairs. No special privileges can be granted one organization or class of organizations that are denied others.

5. *Relations within Organizations.*—Problems concerning relations between organizations and subordinate organizations and individuals are similar in character to those concerning

relations between the nation and internal organizations—strictly internal affairs are not to be interfered with from outside. Industrial organizations present problems of difficulty. They are essentially triumvirate in nature, consisting of (1) plant, tools and materials representing capital, (2) technical information and skill and (3) operating labor. In the larger older organizations the three are quite distinct; a group of bankers supply the capital, hired experts do designing, testing of raw materials and product and make sales while more or less skilled labor keeps up routine production. The equitable divisions of earnings and losses is a difficult problem. When capital assumes responsibility for losses or contributes valuable ideas it is obviously entitled to a larger share than when it does neither. When technical experts shall have become as strongly entrenched as both capital and labor now are, the working out of the principles of equity may be brought to an issue.

6. *Relations between Individuals.*—The principles governing relations between individuals are already fairly well covered by the ordinary civil and criminal codes, worked in accordance with common sense and equity over long periods of time. Some of the more difficult and but partly solved problems involve the basis for compensation for service and equity in cases in which psychic forces are a factor. Special privilege is to be everywhere denied, that is, equality of rights and privileges must be everywhere secured and guarded.

Nowhere else is the premium on superior strength, skill or activity greater than with individuals. Let the winnings be limited to the winners. Inherited wealth, position, or influence should be regarded as an asset to the nation and a probable destructive agent for the inheritor. Individual talent is by far the greatest asset of the nation and its development and utilization the greatest single problem. That great group of problems dealing with the attainment of the maximum knowledge and skill by the individual relates to the education of the expert. Another important group of problems relates to securing a maximum of achievement; and still another to the increase and application of organized knowledge.

7. *Development of the Expert.*—In a really efficient democracy all important problems will be in the hands of experts for solution. Since men of ability come about equally from all classes, provision must be made to train and select individuals from all classes alike. In a broad sense, every one who applies special knowledge to special problems is an engineer, be he electrician, physician, bridge builder, skilled agriculturist, banker

or teacher. Some specialists, such as the physician and the farmer, require many volumes of special information and years of experience in its application. Other specialists require chiefly breadth and generality of knowledge, picking up their special training in a few months. In each profession preparation starts with the most general academic information, proceeds to "make believe" real problems and ends with problems involving full responsibility.

Interest in the general problem centers largely on (1) equality of opportunity, (2) efficient general instruction and training—mental, moral and physical, (3) age of choice of specialty, (4) freedom to transfer from one line to another, (5) efficient semi-technical education, (6) technical instruction and training through practical work and research, (7) state and national coordination in aims, methods and standards and (8) government boards of specialists to investigate and advise as to efficiency in methods and enhanced quantity and quality of output.

Our present mobile, ill-defined policies in education have been well adapted to our period of rapid national development, but the time is at hand for systematized improvement under the guidance of trained experts. The preliminary development has been well done—our educational system, such as it is, is "close to the ground" and already approximates roughly to our requirements. We need chiefly unity and refinement of methods. The rigid elimination of educational weeds and all similar glaring defects long tolerated should come first of all. Our racial stocks of raw material are excellent—able and eager to learn. It must be admitted, however, that our methods are slack and our typical product a "slacker" until caught in the whirl of real life. Our greatest problem with our own sons is to put "sand" into them, to fire them to achievement. Lax school discipline and low standards do not help; in fact, the results of lax school methods frequently persist through life.

Our engineering schools and other methods of developing experts are as a rule excellent in aims, methods and results. Perhaps the greatest need is for increased attention to thorough knowledge of fundamental principles. It should be continually emphasized that the chief factor in the standing of any engineer or professional man is his command of fundamental principles. We are a practical nation and are too prone to pick up knowledge by experience and let it go at that, paying too little attention to the results already achieved by others. The mere quack is the extreme type of deficiency in knowledge of fundamental principles. The problem of the complete elimination of quackism involves modification of curricula in some instances, but is chiefly dependent upon our instructors and leaders in each line.

Finally, some sort of supervision might well be exercised over the process of education that continues through middle and later life. All real experts continue to acquire further knowledge of fundamentals and additional skill through experience as long as they live. The problem is to make such knowledge more available and to increase opportunities for professional intercourse for the interchange of ideas and experiences.

8. *The Increase of Organized Knowledge.*—Man's inquiring mind is forever prying into things and frequently dislodges an idea worth exhibiting and preserving. Some of these either alone or built into a structure of previously discovered ideas prove highly useful or instructive or entertaining or otherwise contributory to his well-being. To achieve certain desired results, he searches the general storehouse for an idea or principle applicable to the purpose. That failing, he digs in the unknown to find one. Research uncovers new ideas, engineering applies to special problems general principles already known. Research shades off into engineering on the one hand and into creative art on the other. It ranges from the very general and fundamental to the special and practical. Without it we should have had none of the sciences and none of the products of the sciences.

The bulk of the research work is done either in (1) educational institutions, (2) the administrative departments of the government or in (3) special research laboratories supported by various industries. Some fields of research involving expensive equipment and from which little or no financial return is to be expected have been provided for by private endowment.

Since our higher educational institutions are our chief conservers and disseminators of organized knowledge, it is but natural that they should lead in the development and extension of that knowledge. However, the plant is designed primarily for teaching and is but ill adapted to research. Neither students nor instructors have more than scraps of time to put on research, while effective research requires steady, continuous application. The biggest problem in university research is to remedy these conditions.

Since the university instructor's time is devoted chiefly to teaching fundamental facts and principles and the student's chiefly to acquiring them, the research undertaken by both is naturally adapted to these purposes. This is doubtless as it should be. Our chief ground for criticism is (1) that the instructor is too crowded with teaching to do enough research work to found a real school for specialists and (2) the student either does not take his work seriously enough or give it time enough to get results of any great value as a rule. Under the circumstances, it is rather surprising—a credit to native ability—that so many pieces of really good work are turned out.

Industrial research laboratories have been started in great numbers in recent years in response to insistent demand for more precise knowledge and a clearer understanding of the fundamental principles applicable to specific problems. The public does not realize the desperate plight of a plant that has run into some obscure works trouble, stopping production. As in cases of illness, diagnoses quickly but surely made by experts are indicated and treatment is prescribed, but by physicists, chemists and engineers as physicians. The original industrial laboratories were staffed by scientists retained largely to look after works troubles where they occurred. Then there is raw material to be tested, specifications to be written, product to be tested, new products and processes to be nursed along into the works.

A full-fledged research division of a large industrial concern may properly consist of two wings, one devoted to fundamental research, the other to engineering research covering routine testing and the simple works troubles. The former covers the field between pure science and special works troubles and may be expected to yield a considerable harvest of scientific papers as well as patents and technical reports. With work continued day after day on full time and means always at hand for obtaining needed equipment or assistance, it represents research under its most favorable conditions. Stakes are high so that there is abundant incentive to earnest effort, in fact pressure is likely to run too high for best results.

The chief problems connected with industrial research laboratories are of a minor nature; securing a sufficient number of good physicists and chemists—men thoroughly grounded in fundamentals—having a high degree of originality, together with good judgment, (2) making it easier for research men to come and go, thus putting all research laboratories more on the basis of graduate schools and (3) improving the interrelations between universities and industrial laboratories.

National research has to do with the solution of problems concerning general welfare. Like industrial research, it ranges in character from pure science to statistics and pure engineering—the application of known principles to specific problems. It covers public health, transportation, communication, finance, education, labor, patents, standards, weather and statistics as well as the conservation, utilization and development of natural resources in minerals, agriculture, fisheries and forests. Much of the research is in the nature of special problems and nearly all of it can be most efficiently accomplished by highly trained experts. Since as a rule these experts are not to be had ready trained, the government must select and train its own from among persons of sufficient general academic training.

Government technical work is carried on by the greatest single body of scientifically trained experts in the country and is on the whole well planned and carried out. There is a large percentage loss (20 to 30 per cent. annually) of the best men in some bureaus—practically the same as in institutions of higher education—hence government research bodies constitute in a sense a great graduate technical school. This condition is to the advantage of the country at large, but it would undoubtedly be for the best interests of all if a higher percentage of the best men were retained in the service. Conditions indicate that (1) higher salaries should be paid and a better system of promotion put in force to retain in the services more high-grade men. (2) The work should be more highly organized and centralized to promote team work and cooperation. Possibly a sort of university organization with a few lectures by experts and many seminars and conferences would be advantageous in attracting good men to the service and giving a wide selection from which to draw. Obviously political appointments should be limited to clerical and unskilled labor and should be limited even in those classes.

9. *Incentives to Achievement.*—However great our knowledge or skill, we accomplish nothing unless fired to achievement by powerful incentives. As a rule we produce hardly ten per cent. of the results of which we are capable, due partly to lack of opportunity, but mostly to lack of incentive. We are a nation of slackers. We fail to live up even to our opportunities by at least seventy per cent. Obviously then the problem of incentives is one of the most vital in the problem of the welfare of the nation.

Men of great achievement are invariably those who supply or create their own incentives. They are typified by the hen which, of her own effort, was unable to fly over a fence, but by worrying a dog into chasing her, was able to mount the fence with ease. The incentive of the hen roost was inadequate, but that of self-preservation was ample for the task to be accomplished. Men of achievement are not content merely to earn a living or even to live up to a certain standard, but are constantly spurred to greater endeavors, to attacking ever more difficult problems, to win over ever more powerful rivals. A fatuous content with existing conditions and previous accomplishments is as intolerable as a shirt of fire.

The psychology of achievement presents many complex problems not easily disposed of. Both temperament and education are involved. Incentives to activity are many and varied, some of the most powerful arising in ideas and impulses coming apparently from nowhere. The choice of activities leading to greater or lesser achievement is always with us and that choice frequently depends upon factors almost fortuitous. It is hoped that these problems may receive the most serious consideration of psychologists as an issue in national welfare.

In conclusion then it may be stated that the proper field for the application of organized knowledge is to secure and enhance the national welfare through increasing the strength, the skill and the activities of the nation, the organization and of the individual. The nation requires organized knowledge for administration, for safeguarding the public welfare and for directing the best development, utilization and conservation of national resources—natural, intellectual, manual and financial. Organizations require it for the attainment of the purposes for which they are organized. Individuals require it to assist them in living up to their possibilities. Although the advantages of its application are matters of the simplest common sense, we are but beginning to apply organized knowledge in an organized manner. The results to be anticipated from such a general and systematic application are almost beyond conception.